



ARKANSAS
Department of Environmental Quality

AFIN# 54-00068 PERMIT#
MEDIA: HAZARDOUS SUPERFUND, BROWNFIELD
ENFORCEMENT, COMPLIANCE, PERMITTING
DATE: 2-4-08

08-5-16927

February 4, 2008

Geomatrix
Attn: Kelly Beck
Project Manager
5725 Highway 290 West, Suite 200-B
Austin, Texas 78735-8722

RE: Facility Investigation Workplan for Cedar Chemical Company (January 18, 2008)
EPA ID Number ARD990660649; AFIN 54-00068

Dear Ms. Beck:

The Arkansas Department of Environmental Quality – Hazardous Waste Division (ADEQ) has reviewed the January 18, 2008 Cedar Chemical Company Facility Investigation Workplan (FIWP). Based on our review we offer the following comments and suggestions:

- It is recommended the FIWP contain information on the proposed new monitoring well development if it is still your intent to install new monitoring wells as part of the site investigation.
- In Section 3.1, paragraph 2, bullet 1, the text mentions the use of roto sonic drilling for the installation of perched wells. However, Section 1 mentions perched wells will be installed using hollow stem augers. This discrepancy should be amended. You should be mindful that the Cedar site has unconsolidated sands and silts. With these types of soils the use of roto sonic drilling can be challenging. However, the roto sonic drilling method has been used at other sites near the Cedar location and has proven to be effective.
- In Section 3.4 sample collection for laboratory analysis in all areas except for the drum vault are proposed to be taken less than 5 feet below the surface. Samples at the drum vault are proposed to be collected about 5 feet below the drum vault foundation. Soil samples collected in 2005 at the drum vault area identified dinoseb concentrations ranging from 38 parts per million (ppm) to 255 ppm between 16 to 23 feet below the surface. Targeting shallow sampling points within the areas identified within this section for further investigation does not seem to meet the objective of filling in data gaps for the future development of a feasibility study. Please amend the sampling investigation approach for each area in order for a full (at depth) investigation to take place. The focus of the FIWP should be to collect enough data to determine the full extent of horizontal and vertical contamination at the site.

There is no mention of conducting any further investigation of the existing wastewater treatment ponds. ADEQ feels that sludge samples and sludge thickness would be

necessary in order for the volume calculations to be complete in the feasibility study. Please amend the FIWP to include investigation of the wastewater treatment ponds.

In paragraph 2 it is stated if waste materials or other evidence of gross contamination is observed, additional data will be collected (note: the FIWP only allows for a minimum of one soil sample to be collected 0 to 5 feet below the drum vault base). There is mention of additional sample collection in areas of suspect intervals. ADEQ feels based on previous sample analysis collected around the drum vault area, more planned sample points, at depth, need to be included in the FIWP.

- In Section 3.5, paragraph 2, there is mention of temporary seals on the drum vault floor slab. ADEQ recommends the intrusions into the drum vault be permanently sealed instead of the proposed temporary seal since the roof of the maintenance building, in which the drum vault is located, leaks.
- In Section 3.9, paragraph 2, there is discussion of the approach that will be used to collect information to update the well survey. ADEQ has found it helpful to contact the city and county offices to gather land and planning maps and to contact the water user associations in the general area of a site to obtain information regarding the domestic water services offered in the general area.
- In Section 3.10 there is discussion about well abandonment. ADEQ has Plug and Abandonment Procedures. These are included as an attachment to this letter.
- In the QAPP (Appendix A), Section 3.4.1, the list of groundwater parameters is not consistent with the list of groundwater parameters mentioned in the previous Sampling and Analysis Plan Summary. This discrepancy needs to be corrected and/or justified.
- There is some concern the testing proposed in the QAPP (Appendix A) will not adequately characterize the contamination at the Cedar site. There were several chemicals produced at the site that will not show up by using the analytical methods proposed in the FIWP. At a minimum, the lab should use the EPA Method 8270 to look for herbicides and pesticides. The ADEQ lab uses a separate multicomponent standard when testing for pesticides. ADEQ would be glad to discuss this analytical approach with the selected certified laboratory.

Geomatrix needs to respond to each one of the above listed comments and suggestions and submit a revised FIWP no later than February 22, 2008. All of the above items can be discussed in detail during the planned February 12, 2008 meeting. In the meantime, if you have any questions or need additional information, please feel free to contact Tammie J. Hynum of my staff at (501) 682-0856 or hynum@adeq.state.ar.us or myself at (501) 682-0831 or at benefield@adeq.state.ar.us.

Sincerely,



J. Ryan Benefield, P.E.
Hazardous Waste Division Chief

Enclosure

cc: Mark Hemingway, P.G., Geomatrix
Dave Roberson (DeMaximis, Inc. 2203 Timberloch Place, Suite 213 The Woodlands, TX 77380)
Anne Weinstein, Attorney Specialist, ADEQ
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Deborah D. Kuchler (Abbott, Simeses & Kulcher, 400 Lafayette St. Suite 200, New Orleans, LA 70130)
Edward Brister (Helena Chemical Co., 225 Schilling Blvd. , Suite 300, Collierville, TN 38017)
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Mark Zuschek (3225 Gallows Road, Suite 3D 2110, Fairfax, VA 22039)

ARKANSAS DEPARTMENT OF POLLUTION CONTROL & ECOLOGY

LEGAL DIVISION MEMORANDUM

TO: Randall Mathis

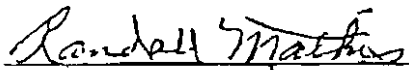
FROM: Steve Weaver, Chief Counsel


DATE: April 8, 1996

SUBJECT: Groundwater Monitoring Well Guidelines

The PRC has reviewed the proposed guidelines for approval of groundwater monitoring well construction and operation. The guidelines are quite detailed and exhaustive, and Mr. Rostand should be commended for his efforts. The PRC notes, however, that these guidelines should be consistent with comparable practices in the Department outside of the Hazardous Waste Division, as well as with guidelines applied by other state agencies dealing with similar technical issues. Therefore, the PRC recommends that the proposed guidelines be forwarded to the Water, Solid Waste, and Regulated Storage Tank Divisions of the Department for a forty-five (45) day review and comment period. At the same time, the PRC recommends that the following sister state agencies be afforded the opportunity to review and comment upon the proposed guidelines: the Soil & Water Commission, the Water Well Commission, and the Oil & Gas Commission. All comments received from other divisions and agencies should be forwarded to the PRC for review and final resolution. In the meantime, the Hazardous Waste Division may apply the proposed monitoring well guidelines as an interim policy.

APPROVED.


Randall Mathis, Director


Date

ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

HAZARDOUS WASTE DIVISION

POLICY #: HWD - 002

Monitoring Well Construction, Geotechnical Boreholes, And Plug & Abandonment Policy

I. STATEMENT OF ISSUE

There are occasions when facilities are required or desire to install groundwater monitoring wells, plug and abandon monitoring wells, or install geotechnical boreholes for the purpose of obtaining samples for chemical analysis of groundwater and other physical data. The data obtained is used to evaluate the environmental impact on hydrogeologic conditions from facility operations.

Properly located, designed, installed, and maintained monitoring wells are necessary for obtaining representative groundwater samples and to protect the environment. Improperly located, designed, installed, and/or maintained monitoring wells can increase a facility's liabilities by failing to identify environmental impact at an early stage or providing a mechanism for contaminants to migrate into uncontaminated areas. Failure to follow proper procedures could result in introducing additional contaminants to the subsurface.

The Arkansas Department of Pollution Control & Ecology (ADPC&E) does not regulate individuals who drill and/or install groundwater monitoring wells, nor individuals who conduct hydrogeologic investigations. However, such individuals are regulated by other Arkansas agencies in accordance with state law. Drillers and well/pump installers are regulated by the Arkansas Water Well

Construction Commission (AWWCC). The practice of geology is regulated by the Arkansas Board of Registration for Professional Geologists. Land surveying and engineering are regulated by the Arkansas Board of Registration for Professional Engineers and Land Surveyors.

ADPC&E has various authorities which require groundwater investigations, monitoring, and corrective action. This policy is directed at facilities conducting subsurface investigations, monitoring, and/or remediation related to hazardous waste or hazardous substance sites. This policy of the Hazardous Waste Division (HWD) provides a set of guidelines for facilities conducting such surveys. Any workplans, site investigations, or other hydrogeologic reports submitted to the HWD must reflect compliance with this policy or may be unaccepted.

II. STATEMENT OF POLICY

All monitoring wells, piezometers, other specialty well designs, and other related permanently installed equipment shall be installed, repaired, and abandoned in a manner which complies with all applicable state laws and as specifically directed by ADPC&E.

1. It shall be the policy of the ADPC&E HWD that all monitoring wells, piezometers, specialty well designs, and other related permanently installed equipment be installed, repaired, or abandoned by qualified persons utilizing appropriate methods in accordance with AWWCC Code Rules and Regulations (revised August 1993) as applicable. Copies are available from:

Arkansas Water Well Construction Commission
101 E. Capitol, Suite 350
Little Rock, Arkansas 72201

2. At a minimum, the design and construction techniques published by the United States Environmental Protection Agency (USEPA) in the Resource Conservation and Recovery Act (RCRA) Ground Water Monitoring Technical Enforcement Guidance Document (TEGD) shall be used as a guide in the location, construction, and design of monitoring wells, in

accordance with AWWCC rules and regulations. Therefore, it shall be the policy of the HWD to assure that this is accomplished in an orderly scientific manner by the following procedures:

- a. The HWD will review Hydrogeologic Workplans, Investigations, Reports, and other submittals for compliance with the RCRA TEGD and the AWWCC rules and regulations for installing and/or plugging and abandoning of boreholes and groundwater monitoring wells. Failure to follow the RCRA TEGD and/or the AWWCC may result in both non-approval of submitted documents and possible notification to the AWWCC.
- b. The HWD will conduct Comprehensive Groundwater Monitoring Evaluation (CME), Operation and Maintenance (O&M), and/or other site inspections to discern if the groundwater monitoring system is in compliance.

3. Well Installation Procedures

It is assumed that the site hydrogeology has been characterized and all pertinent data have been collected, evaluated, and certified to the degree necessary to properly design and locate the well in a manner suitable for its intended purpose.

Geological conditions and interpretations must be certified by an Arkansas Registered Professional Geologist. As previously stated, the Arkansas Board of Registration for Professional Geologists (Board) maintains the certification of individuals, not the HWD of ADPC&E. Failure to follow the bylaws of the Board, will be addressed by the Board.

a. Well Design

There are several well designs which are acceptable for use at sites regulated by the HWD. Final well designs are generally evaluated on a case-by-case basis in conjunction with site-specific information to accommodate specific needs. In any case, the design, construction materials, and installation materials are to be suitable for the site-specific situation. The publications containing acceptable

designs, construction methods, and standard construction practices used in the decision process are the following:

- i. USEPA RCRA Groundwater Monitoring Technical Enforcement Guidance Document, September 1986, OSWER-9950.1
- ii. ASTM Designation: D 5092-90 Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers
- iii. USEPA Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, March 1991, EPA/600/4-89/034

b. Drilling Practices

- i. All drilling and well installations must be performed by qualified persons registered or specifically exempted by the AWWCC. Individuals performing these services are responsible for filing any applicable AWWCC reports. As previously stated, AWWCC regulates these individuals, not the HWD of ADPC&E. Failure to follow the AWWCC Code Rules and Regulations will be addressed by the AWWCC.

As a general rule, there is no single drilling method which is suitable for all geological conditions likely to be encountered in this state. The drilling method selected must be based upon the geological conditions likely to be encountered, the type of information to be collected, and to minimize the potential for cross-contamination between intervals. Air drilling is generally not an acceptable method for the collection of samples for chemical analysis or geotechnical information.

- ii. All drilling equipment and well materials must be properly decontaminated prior to commencement of activities. This is usually demonstrated with decontamination blanks as part of a QA/QC program.

- iii. All drill cuttings and drilling fluids must be properly managed in a manner that minimizes contamination to the immediate area and complies with Arkansas Pollution Control & Ecology Commission Regulation No. 23 (hazardous waste management) requirements. This is accomplished by containerizing the drill cuttings, drilling fluids, formation water, decontamination wastes, etc. Investigation-derived waste is considered the generation of a potential hazardous waste. Prior to disposal, this investigation-derived waste must be managed as hazardous waste until a determination under Regulation No. 23 Section 261 is made. Such wastes are also subject to hazardous waste accumulation and storage requirements.
- iv. Drilling fluids must only be used when necessary to maintain stable borehole conditions. Drillers using the mud rotary method of drilling must ensure an adequate volume of mud is available to complete the borehole prior to initiating drilling activities. In general, 1.5 - 3 times the volume of the finished hole is the required mud volume. The volume of the hole must be based upon the largest diameter drill bit intended to be used in that boring. Only potable water or water of known chemistry must be used in drilling fluids. The HWD advises extreme caution when using mud- or wash-rotary drilling techniques, due to the potential of cross-contamination and well development difficulties associated with the mud cake. Any additive must not adversely affect borehole stability, groundwater quality, or analytical objectives.
- v. All boreholes in which a monitoring well is to be constructed must be continuously logged, unless the site-stratigraphy is well established. In cases where the site-stratigraphy is well established, a monitoring well may be logged at an appropriate interval for both well correlation and screen placement. Standard coring devices must be

used to collect samples. Logging from drill cuttings is generally not an acceptable practice. ASTM Designation: D 2488-84 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) is the HWD's preferred soil classification system. Examples of the information required on boring logs can be found in the referenced documents.

c. Well Construction

- i. All monitoring wells must be cased. Both single and multiple casing well designs are acceptable. Multiple well casing designs must be used when contaminated zones of saturation are isolated by a confining layer from lower intervals to be investigated or monitored. When using multiple casing designs, the cement slurry must be allowed to cure (according to the manufacturer or other published references) prior to drilling into lower intervals. Driven (including hydraulically pushed) wells are not acceptable for permanent monitoring locations, but may be used temporarily in investigations provided they are removed and the borehole is properly plugged and abandoned as described herein.
- ii. The following are standard components of a permanent monitoring well: bottom sump, screen, casing, centralizer, annulus, filter pack, bentonite seal, annular grout, surface seal, protective equipment, and a well cap.

In general, the sump, screen and casing must be composed of chemically inert materials suitable for the site-specific variables. There are numerous commercially available material types that are suitable for monitoring wells. Selection of the appropriate type of material must be based upon site-specifics and published references. Commonly-approved materials are PVC, stainless steel, fluoropolymer materials (PFTE), and fiberglass reinforced epoxy resins.

- A. A sump must be placed at the bottom of the well screen. The top of the sump must be below the top of the confining layer. The sump must be deep enough to minimize silt accumulation in the screened interval and allow for sample collection. In order to allow for the locating and sampling of dense nonaqueous phased liquids (DNAPL's or sinkers), sumps must be set into the confining unit.
- B. Well screens may be continuous-slotted or wire-wrapped type, but must be constructed of materials which are manufactured as well screen. Perforated types are generally not used in monitoring well construction. Slot size must be selected according to the size of the filter pack material and must minimize the introduction of fines into the well. Grain size analysis of the interval to be screened is recommended to make the determination of slot size. Screen lengths must be selected according to the intended use of the well and the interval to be monitored.

The HWD will allow screens up to 15 feet in length to be used for the first zone of unconfined phreatic water. The screen must be set such that the screen is bisected by the static water level. This design allows for seasonal fluctuations across the screened interval and is suitable for the detection of light nonaqueous phased liquids (LNAPL's or floaters). This design is also suitable for situations which require monitoring at the interface of the water table and capillary fringe or vadose zone.

In most other cases, well screens of 10 feet or less are preferred. Special needs of site-specific conditions are determined on a case-by-case basis.

- C. Well casing must be constructed of materials which are manufactured as well casing. All casing materials must form a water tight seal at the

joints. Threaded joints are recommended. Solvent welded joints are not acceptable for monitoring wells. The casing, screen, etc. must be installed straight and plumb, such that sampling and water level equipment can be used without obstruction.

- D. Centralizers should be used to center the well in the borehole and keep the casing straight. Care must be taken in locating centralizers where they will not interfere with the placement of the sand pack, bentonite seal, or annular grout. Centralizers must not be placed within the bentonite seal.
- E. A filter pack must be used in the annulus around the well screen. The use of natural filter packs (allowing the collapse of the formation around the screened interval or driven well screen) is discouraged, but may be considered in certain situations. The filter pack must consist of a chemically inert, well-graded, high silica sand that is the appropriate diameter for the screen selected. The filter pack must be placed utilizing a tremie pipe and/or tamping methods. The calculated filter pack volume and the volume of materials used must be recorded. The depth to the top of the filter pack must be measured and recorded. The top of the filter pack must extend approximately 2 feet above the top of the screen.
- F. All wells must have a bentonite seal immediately above the filter pack. This seal retards the movement of cement-based grout into the filter pack. The calculated volume and the volume of the sealant-material used must be recorded. The depth to the top of the bentonite seal must be recorded.

Bentonite must be powdered, granular, pelletized, or chipped sodium montmorillonite from a commercial source and free of impurities which could adversely affect groundwater quality. As a general rule, pellets or chips should be less than

one fifth the width of the annular space to avoid bridging problems. If the bentonite pellet seal is being constructed above the water level, water from a known source and free of contamination must be poured into the annulus to hydrate the pellets prior to grouting the annulus. The bentonite seal must extend about 3-5 feet above the filter pack. An exception to this would be an extremely shallow well (i.e., less than 10 feet).

- G. The annulus of the well (diameter of the borehole) must be a minimum of 4 inches greater than the outside diameter of the casing and screen to allow proper placement of the filter pack, bentonite seal and annular grout.
- H. All monitoring wells must have a cement base grout slurry placed from the bentonite seal to the ground surface in the annulus. The grout slurry must be placed using tremie methods or injected under pressure to avoid bridging. The cement must be one of the five Portland cement types specified in ASTM Specification C 150.
- I. All monitoring wells must be constructed with a surface seal. The surface seal must be installed on top of the grout seal and extend vertically up the well annulus between the well casing and the borehole to the land surface. Where appropriate, the lower end of the surface seal must extend at least one foot below the frost line in order to prevent damage from frost heaving. In aboveground well completions, the surface seal should form at least a two-foot wide, four-inches thick neat cement or concrete apron at the land surface. The apron must be constructed with a slight slope to drain surface water radially away from the well casing to prevent leakage down the outer casing.
- J. All monitoring wells must be constructed with a cap. Locking caps are recommended for all well locations to minimize the potential of tampering with the well. Flush-mounted wells must be fitted

with a leak-proof cap to prevent surface water from entering the well bore and be designed such that surface water will not enter or stand on the installation. Ideally, the cover cap must also be leak-proof. If any well is artesian, the well cap must prevent uncontrolled discharges from the well.

- K. The installation of protective equipment is recommended on all monitoring wells. Guard posts, locking well caps, protective covers, markers, signs, etc. are recommended by the HWD. The level of protection should meet the damage threat posed by the location of the well.
- L. All wells must be properly developed upon completion and prior to sampling. Development serves to: a) remove the fine-grained material from the well screen and filter pack that may otherwise interfere with water quality analysis; b) restore the groundwater properties disturbed during the drilling process; and c) improve the hydraulic characteristics of the filter pack and hydraulic communication between the well and the hydrogeologic unit adjacent to the well screen. Some common development methods include: mechanical surging, bailing, pumping, over-pumping, air-lift pumping, and jetting. As a general rule, the finer grained the hydrologic unit, the more gentle development method needed. The development method and development documentation data must be recorded. At a minimum, documentation of development must demonstrate that conditions are visibly free of turbidity and that pH and specific conductance readings are stable (within 10%) in at least four consecutive casing volumes. Optional quality assurance for well development may include turbidity measurements and hydraulic parameters which are obtained from pump tests and/or slug tests.
- M. All well locations must be surveyed to the nearest

0.1 feet horizontally (location) and to the nearest 0.01 feet vertically (elevation of the reference point that water levels are measured from). A surveyed reference point, for use as a measuring point, must be clearly marked and be placed on the top of the well casing, not on the protective casing or the well apron, because the well casing is more stable than the protective casing or well apron. The HWD prefers that the vertical reference point be given in reference to sea level, which in turn is established by reference to an established National Geodetic Vertical Datum (NGVD). All surveys must be certified by an Arkansas Licensed Land Surveyor.

- N. A detailed construction log of the well is required. It must contain all of the well construction information previously discussed.

4. Plugging and Abandoning of Wells and Boreholes

- a. The well casing must be removed from the borehole by pulling or drilling out.
- b. All annular material (grout, bentonite seal, filter pack, etc.) must be removed from the borehole.
- c. All boreholes (regardless of well construction) must be pressure-cemented back to the surface, utilizing a tremie pipe inserted to within two feet of the total depth of the borehole and a cement-bentonite grout circulated back to the ground surface. Any shrinkage or settlement of the grout must be remedied by filling the remaining void with additional cement-bentonite. The cement-bentonite mixture utilized is to be the same as described for annular grout in the Well Installation Procedures (Section ~~3.b.8.~~ ^{3.C.11.H}).
- d. The minimum standards for plug and abandonment of any well or borehole are specified in AWWCC Rules and Regulations.

III. STATEMENT OF BASIS

The Arkansas Department of Pollution Control and Ecology (ADPC&E) has prepared this document to provide a uniform and reliable reference of the preferred materials, procedures and practices for the construction and plugging and abandonment of groundwater monitoring systems and boreholes. Deviations from the use of procedures or materials described in this policy, without prior approval by ADPC&E, may result in the work not being accepted.

HWD CHIEF

CHIEF COUNSEL

DEPUTY DIRECTOR

DEPUTY DIRECTOR

DEPUTY DIRECTOR

DIRECTOR



ARKANSAS
Department of Environmental Quality

ROUTING SLIP

February 4, 2008

Subject: Cedar FIWP (January 2008)

From: Tammie J. Hynum, Technical Branch Manager, Hazardous Waste Division

<u>Route in turn to:</u>	<u>Action Needed</u>	<u>Initials</u>	<u>Date</u>
Jay Rich	Concurrence/Review	JR	2/4/08
Jim Rigg	Concurrence/Review	JR	2/4/08
Clark McWilliams	Concurrence/Review	CM	2/4/08
Kin Siew	Concurrence/Review	KS	2/4/08
Ryan Benefield	Review/Concurrence/Sign	RB	2/4/08

DISPOSITION:

Return to Tammie Hynum, HWD (682-0856) for reproduction, distribution of copies, filing, and mailing.

COMMENTS:

Comment letter to Geomatrix on the FIWP (January 2008). Requesting revisions and a revised FIWP by 2/22/08. These deficiencies will be discussed in the 2/12/08 meeting to be held at ADEQ.